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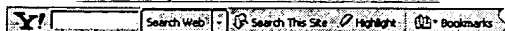
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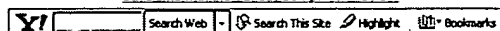
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Constants that have character-string values use the single quotation mark character (') as the string delimiter. To make the compiler accept this character, use the compiler option APOST.

The copy file CMQV contains declarations of the named constants as level-10 items. To use the constants, declare the level-01 item explicitly, then use the COPY statement to copy in the declarations of the constants:

```
WORKING-STORAGE SECTION.
01 MQM-CONSTANTS.
   COPY CMQV.
```

However, this method causes the constants to occupy storage in the program even if they are not referred to. If the constants are included in many separate programs within the same run unit, multiple copies of the constants will exist—this may result in a significant amount of main storage being used. You can avoid this situation by adding the GLOBAL clause to the level-01 declaration:

```
* Declare a global structure to hold the constants
01 MQM-CONSTANTS GLOBAL.
   COPY CMQV.
```

This causes storage to be allocated for only *one* set of constants within the run unit; the constants, however, can be referred to by *any* program within the run unit, not just the program that contains the level-01 declaration.

Coding in System/390^(R) assembler language

System/390 assembler is supported on OS/390 only.

See [Appendix A, Language compilers and assemblers](#) for the assemblers that you can use to process your assembler-language programs.

Note the information in the following sections when coding MQSeries for OS/390 programs in assembler language.

Names

In this book, the names of parameters in the descriptions of calls, and the names of fields in the descriptions of structures are shown in mixed case. In the assembler-language macros supplied with MQSeries, all names are in uppercase.

Using the MQI calls

The MQI is a call interface, so assembler-language programs must observe the OS linkage convention. In particular, before they issue an MQI call, assembler-language programs must point register R13 at a save area of at least 18 full words. This save area is to provide storage for the called program. It stores the registers of the caller before their contents are destroyed, and restores the contents of the caller's registers on return.

Note: This is of particular importance for CICS assembler-language programs that use the DFHEIENT macro to set up their dynamic storage, but that choose to override the default DATAREG from R13 to other registers. When the CICS Resource Manager Interface receives control from the

<http://www-3.ibm.com/software/integration/mqfamily/library/manualsa/csqzal05/csqzal051r...> 9/15/03
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DSECT=YES An assembler-language DSECT instruction is used to start a new data section; the structure definition immediately follows the DSECT statement. No storage is allocated, so no initialization is possible. The label on the macro invocation is used as the name of the data section; if no label is specified, the name of the structure is used.

DSECT=NO Assembler-language DC instructions are used to define the structure at the current position in the routine. The fields are initialized with values, which you can specify by coding the relevant parameters on the macro invocation. Fields for which no values are specified on the macro invocation are initialized with default values.

DSECT=NO is assumed if the DSECT parameter is not specified.

Controlling the listing

You can control the appearance of the structure declaration in the assembler-language listing by means of the LIST parameter.

LIST=YES The structure declaration appears in the assembler-language listing.
LIST=NO The structure declaration does not appear in the assembler-language listing. This is assumed if the LIST parameter is not specified.

Specifying initial values for fields

You can specify the value to be used to initialize a field in a structure by coding the name of that field (without the prefix) as a parameter on the macro invocation, accompanied by the value required.

For example, to declare a message descriptor structure with the *MsgType* field initialized with MQMT_REQUEST, and the *ReplyToQ* field initialized with the string MY_REPLY_TO_QUEUE, you could use the following code:

```
MY_MQMD          CMQMDA          MSGTYPE=MQMT_REQUEST,          X
                  REPLYTOQ=MY_REPLY_TO_QUEUE
```

If you specify a named constant (or equate) as a value on the macro invocation, you must use the CMQA macro to define the named constant. You must not enclose in single quotation marks (') values that are character strings.

Writing reentrantable programs

MQSeries uses its structures for both input and output. If you want your program to remain reentrantable, you should:

1. Define working storage versions of the structures as DSECTs, or define the structures inline within an already-defined DSECT. Then copy the DSECT to storage that is obtained using:
 - o For batch and TSO programs, the STORAGE or GETMAIN OS/390 assembler macros
 - o For CICS, the working storage DSECT (DFHEISTG) or the EXEC CICS GETMAIN command

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stub, it saves the current contents of the registers at the address to which R13 is pointing. Failing to reserve a proper save area for this purpose gives unpredictable results, and will probably cause an abend in CICS.

Declaring constants

Most constants are declared as equates in macro CMQA. However, the following constants cannot be defined as equates, and these are not included when you call the macro using default options:

```
MQACT_NONE
MQCI_NONE
MQFMT_NONE
MQFMT_ADMIN
MQFMT_COMMAND_1
MQFMT_COMMAND_2
MQFMT_DEAD_LETTER_HEADER
MQFMT_EVENT
MQFMT_IMS
MQFMT_IMS_VAR_STRING
MQFMT_PCF
MQFMT_STRING
MQFMT_TRIGGER
MQFMT_XMIT_Q_HEADER
MQMI_NONE
```

To include them, add the keyword EQUONLY=NO when you call the macro.

CMQA is protected against multiple declaration, so you can include it many times. However, the keyword EQUONLY takes effect only the first time the macro is included.

Specifying the name of a structure

To allow more than one instance of a structure to be declared, the macro that generates the structure prefixes the name of each field with a user-specifiable string and an underscore character (_). Specify the string when you invoke the macro. If you do not specify a string, the macro uses the name of the structure to construct the prefix:

```
* Declare two object descriptors
CMQODA          Prefix used="MQOD_" (the default)
MY_MQOD CMQODA Prefix used="MY_MQOD_"
```

The structure declarations in the *MQSeries Application Programming Reference* manual show the default prefix.

Specifying the form of a structure

The macros can generate structure declarations in one of two forms, controlled by the DSECT parameter:

To correctly initialize these working storage structures, copy a constant version of the corresponding structure to the working storage version.

Note: The MQMD and MQXQH structures are each more than 256 bytes long. To copy these structures to storage, you will have to use the MVCL assembler instruction.

2. Reserve space in storage by using the LIST form (MF=1) of the CALL macro. When you use the CALL macro to make an MQI call, use the EXECUTE form (MF=E) of the macro, using the storage reserved earlier, as shown in the example under "Using CEDF". For more examples of how to do this, see the assembler language sample programs as shipped with MQSeries.

Use the assembler language RENT option to help you determine if your program is reenterable.

For information on writing reentrantable programs, see the *MVS/ESA Application Development Guide: Assembler Language Programs*, GC28-1644.

Using CEDF

If you want to use the CICS-supplied transaction, CEDF (CICS Execution Diagnostic Facility) to help you to debug your program, you must add the ,VL keyword to each CALL statement, for example:

```
CALL MQCONN, (NAME, HCONN, COMPCODE, REASON), MF=(E, PARMAREA), VL
```

The above example is reentrantable assembler-language code where PARMAREA is an area in the working storage you specified.

Coding in RPG

RPG is supported on OS/400 only.

See [Appendix A, Language compilers and assemblers](#) for the compilers that you can use to process your RPG programs.

In this book, the parameters of calls, the names of data types, the fields of structures, and the names of constants are described using their long names. In RPG, these names are abbreviated to six or fewer uppercase characters. For example, the field *MsgType* becomes *MDMT* in RPG. For more information, see the *MQSeries for AS/400 Application Programming Reference (ILE RPG)* manual.

Coding in PL/I

PL/I is supported on AIX, OS/390, OS/2 Warp, VSE/ESA, and Windows NT only.

See [Appendix A, Language compilers and assemblers](#) for the compilers that you can use to process your PL/I programs.

Note the information in the following sections when coding MQSeries for OS/390 programs in PL/I.

Structures

Structures are declared with the BASED attribute, and so do not occupy any storage unless the program

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declares one or more instances of a structure.

An instance of a structure can be declared by using the `like` attribute, for example:

```
dcl my_mqmd      like MQMD: /* one instance */
dcl my_other_mqmd like MQMD: /* another one */
```

The structure fields are declared with the `INITIAL` attribute; when the `like` attribute is used to declare an instance of a structure, that instance inherits the initial values defined for that structure. Thus it is necessary to set only those fields where the value required is different from the initial value.

PL/I is not sensitive to case, and so the names of calls, structure fields, and constants can be coded in lowercase, uppercase, or mixed case.

Named constants

The named constants are declared as macro variables; as a result, named constants which are not referenced by the program do not occupy any storage in the compiled procedure. However, the compiler option which causes the source to be processed by the macro preprocessor must be specified when the program is compiled.

All of the macro variables are character variables, even the ones which represent numeric values. Although this may seem counter intuitive, it does not result in any data-type conflict after the macro variables have been substituted by the macro processor, for example:

```
ldcl MQMD_STRUC_ID char;
%MQMD_STRUC_ID = 'MQMD ';;

ldcl MQMD_VERSION_1 char;
%MQMD_VERSION_1 = '1';
```

Coding in TAL

TAL is supported on Tandem NonStop Kernel only.

See [Appendix A, Language compilers and assemblers](#) for the compilers that you can use to process your TAL programs.

Note the following when coding MQSeries for Tandem NonStop Kernel programs in TAL:

- The MQI library (bound into the application process) does not open `$RECEIVE` and does not open `$TMP` (TM/MP transaction pseudo-file) itself, so you may code your application to use these features.
- The MQI library uses a `SERVERCLASS_SEND_Q` call in initial communication with the Queue Manager. While connected, it maintains two process file opens (with the LINKMON process and a Local Queue Manager Agent) and a small number of disk file opens (fewer than 10).